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Romulea subfistulosa (De Vos): New Crop Report

Taxonomy

The genus *Romulea* consists of approximately 90 species of perennial plants found in Africa and the Mediterranean. It is named for Romulus, one of the mythical co-founders of Rome and home to some members of the genus (Manning 2009). *Romulea* are part of the Iridaceae (Iris) family. Their common name is sometimes known as Frutang or Froetang (Manning 2009, Struik 1993). *Romulea subsfistulosa* was first described in 1952 by Miriam P. de Vos (De Vos 1983). It is part of the subgenus *Spatalanthus*.

Taxonomic Description

R. subfistulosa is a deciduous perennial. It grows during winter (June-September) and undergoes a period of dormancy during summer (December-March). Like other Iridaceae, it is a bulbous geophyte and accomplishes its dormancy through energy storage in a corm. *R. subfistulosa* is a low growing somewhat spreading plant and has elongated narrow leaves. Its flowers have an opening bell-shape and are very attractive in form and color (**Fig. 1)**. The plant blooms from August through September (Manning *et al.* 2001). Members of the genus *Romulea* have edible fruits and their juicy texture was often enjoyed by children (Manning 2009).

Plants of this species typically grow 120-250 mm (5-10 in.) high. Leaves are basal and occur in groups of 4-9. They are long and narrow (100-250 mm [4-10in.] x 2-5 mm [0.06-0.5 in.] with 8 longitudinal ridges (De Vos 1983, Manning *et al.* 2001). Because the leaves recurve into almost a tube-like shape, they are described as "subfistulose;" hence the specific epithet of the species.

Flowers are 30-60 mm (1.5-2.5 in.) wide and are composed of 6 tepals which flare out and are joined in a cup shape to a short perianth tube (De Vos 1983, Manning *et al.* 2001). The tepals are pink, or perhaps carmine, in color followed by a dark reddish-black transitional blotch which leads to a bright yellow center cup. Filaments are purple or yellow, 4-6 mm (.15-.25 in.) long and topped with yellow anthers reaching 8-11 mm (.3-.4 in.) in length. The style is 9-12 mm (.35-.5 in.) long (De Vos 1983). Peduncles, which can grow 50-150 mm (2-6 in.), are usually low to the ground, but begin to recurve in flower and then straighten in fruit (De Vos 1983, Manning *et al.* 2001).

Stems are generally short but can grow to 90 mm (3.5 in.) (De Vos 1983). They are subterranean during flowering but then emerge for fruiting. Plants of this genus are often very similar in appearance and usually require proper identification by the structure of their corm (Manning *et al.* 2001). Corms of *R. subfistulosa* are rounded at the base and have curved acuminate teeth (Manning *et al.* 2001). They can grow to approximately 15 mm (.6 in.) wide and 20 mm (.75 in.)

long (**Fig. 2**). Each year during the growing season, a new corm forms above an older one in preparation for the oncoming dormant season (De Vos 1972).

Geographic Distribution & Habitat

R. subfistulosa is native to the Cape Province of South Africa. Its natural distribution is on the Roggeveld Escarpment ranging from the area nearby Calvinia southward toward Sutherland on the western edge of the Karoo Plateau (**Fig. 3**) (De Vos 1983, Du Plessis *et al.* 1989). This area corresponds roughly with a latitude range of 31° 25' S to 32° 24' S.

The elevation of this region ranges from 970 m (3180 ft.) to over 1800 m (5890 ft.) above sea level. The climate is considered semi-arid to arid with an average rainfall between 300-400 mm (12-16 in.) per year (Clark *et al.* 2011). The majority of this precipitation (60-70%) occurs in the winter following a dry period during the summer (Clark *et al.* 2011, Pacific Bulb Society 2012).

Temperatures here range from an average 2.8°C (37°F) in the winter to 30°C (86°F) in the summer. The average annual extreme minimum temperature is about -5°C (28°F) and corresponds with a USDA hardiness zone of 9a.

Soils of the Roggeveld Escarpment where *R. subfistulosa* is found are typically fine textured with a parent material of dolerite, shale or sandstone (Pacific Bulb Society 2012). The dolerite soils are reddish-brown in color with a clay texture and neutral to alkaline pH. Shale and sandstone soils here are reddish with a sandy-clay texture. These areas often have high seasonal groundwater levels which are known to support a variety of geophytic plants (Clark *et al.* 2011).

R. subfistulosa is found in the Karoo-Namib phytogeographic region of South Africa. It is known for its high species diversity, most notably in the form of succulents and geophytes (including *R. subfistulosa*) (Du Plessis *et al.* 1989). Many species are also endemic to this region as they are not found elsewhere outside of this limited range (Goldblatt 1978). Due to its habitat elevation *R. subfistulosa* is considered part of an alpine plant community.

Potential to Naturalize

South African Iridaceae have long been popular candidates for horticultural crops due to their often showy inflorescences and hundreds of them have been introduced outside of their native range for these purposes (Manning *et al.* 2002). Of these, over 60 species from the family have been known to become naturalized and even invasive in certain areas (most notably Australia, New Zealand and California). This includes at least four members of the genus *Romulea* (*R. flava, R. minutiflora, R. obscura,* & *R. rosea*) (Van Kleunen *et al.* 2007). *R. rosea* var. *australis* and *R. minutiflora* are also members of the subgenus *Spatalanthus* and considered noxious weeds in Australia (Du Plessis *et al.* 1989).

A study conducted by Van Kleunen *et al.* analyzed 60 species of South African Iridaceae for potential invasiveness. This study included 8 species of *Romulea* (not, however, *R. subfistulosa*). The findings determined that the single greatest factor for potential invasiveness was "rapid and profuse seedling emergence" (Van Kleunen *et al. 2007*). In other words, the plants which provide

the greatest threat are those which germinate sooner and exhibit initial growth faster than native species. Considering that species of the genus *Romulea* have already proven capable of this, including two members of the subgenus *Spatalanthus*, it is imperative to approach the possible horticultural crop introduction of *R. subfistulosa* with caution.

Propagation

R. subfistulosa is a perennial corm producing geophyte. It grows over a four-month period with average temperatures around 6°C (43°F) and low amounts of rainfall. For the remainder of the year it is dormant. If sown from seed, flowering will not occur until the second season (Du Plessis *et al* 1989). As such, it is recommended that primary propagation of this species be conducted vegetatively by means of offset cormel separation.

Corm formation in *Romulea* is primarily governed by temperature (Swart 2012). Winter growing species such as *R. subfistulosa* produce the most corms when temperatures are generally low: between 10°C (50°F) and 20°C (68°F) (Swart 2012). This corresponds to the increasing temperatures that are experienced at the end of the growing season and the onset of spring. It is recommended to separate cormels during the dormant season and store them in preparation for the next growing season (Du Plessis *et al.* 1989). Storage of *R. subfistulosa* corms should be commensurate with conditions of the plant's native range: dry and warm (21-27°C [70-81°F]).

An additional method of encouraging cormel formation known as "scooping" can also possibly be used in the propagation of *R. subfistulosa*. The basal plate is first removed to destroy the terminal growing point. The wound is then treated with a fungicide, callus tissue allowed to form, and the bulb planted shallowly with the basal plate upright in a sandy-peat medium. The bulbs should then be stored in a shaded area at temperatures between 10-15°C (50-60°F). Following the growing season, a number of cormels should have formed which can be removed and used for further propagation (Du Plessis *et al.* 1989, Toogood 1999).

Product Specifications

R. subfistulosa is a cool-weather winter flowering plant. This makes it unique amongst most ornamental horticultural crops and should be used advantageously for marketing purposes. It could be produced for distribution during periods when other plants are not flowering. Because of its short peduncle, it would not make a good cut flower. However, it may prove to be a very successful potted plant; one that provides the promise of spring during dreary winter days. In certain areas it may also prove an attractive addition to an alpine plant garden.

Despite the potential for this species to make an attractive house plant, there are a number of obstacles which may limit the success of introducing *R. subfistulosa* to the North American market. The primary consideration is its native range and life cycle. *R. subfistulosa* comes from an area which is very unlike most of United States. It requires moderately cold (by North American standards) and somewhat dry conditions to flower. During the period of dormancy in the summer, it would need warm dry conditions. Areas of California and the Southwest would offer the only comparable environmental conditions for this species. Also, much of its life cycle

is spent in dormancy. This does not make it particularly attractive to have year round in a household.

If it were possible to force bulbs of *R. subfistulosa*, the plant could make an attractive addition to a bulb pan or such similar container. As such, it would be expected to have flowering timed for early year holidays such as Valentine's Day, Easter and possibly Mothers' Day. Most likely, *R. subfistulosa* would compete with other popular bulb plants such as tulips, irises, crocuses and daffodils. More research would be required, however, to establish the feasibility of bulb forcing for this species.

Cultural Requirements

R. subfistulosa is hardy from USDA zones 9a through 11 (Dave's Garden 2013). It is naturally adapted to hot conditions and drought tolerance. Preferable temperatures for flowering would be around 5-10°C (41-50°F) during the day and 0-5°C (32-41°F) during the night. Light requirements are full sun. Photoperiod response is expected to be short day due winter flowering characteristics. Natural soil conditions in the native range of *R. subfistulosa* are generally sandy to loamy-sand with a neutral to slightly alkaline pH and poor nutrient content. As such, it expected that this plant would not have very extensive medium requirements outside of a sandy texture and good drainage. With a maximum growth height of 120-250 mm (5-10 in.), short stems and peduncles, plant growth regulators should not be needed.

Possible containers for finishing would include a bulb pan or similar pot. Sizes would depend on number of bulbs planted. For a single houseplant specimen, a 4-6 in. pot should be adequate. Recommended containers for seed germination include a 128- or 288-plug tray and then transfer to final container once stage IV growth is reached.

R. subfistulosa is not known to have any serious susceptibility to pests or disease (Du Plessis *et al.* 1989). It is, however, not native to North America and it cannot be determined with certainty if this resistance would transfer to a new growing environment. With consideration to the warm and dry conditions in which the plant undergoes dormancy, it can be expected that high moisture presence during bulb storage may induce fungal rot such as fusarium. Proper storage conditions would be around 21-27°C (70-81°F).

Production Schedule

For vegetative bulb production, considering that flowering occurs in late winter to early spring, bulbs should be planted around week 35. Short day conditions should be initiated by week 1. Flower bud development takes about 16 weeks with flower emergence at 22 weeks. Flowers should be present by week 5 and persist through week 13, possibly longer. Bulbs used for offsets should be separated with the onset of dormancy, around week 18.

With this schedule target sales date would be from weeks 5 until around week 9. Shipping of bulb pans would take place around weeks 3 to 4.

Seed propagation is not recommended for commercial use of *R. subfistulosa*. Flower development does occur during the first year of growth and establishing successful germination is difficult. During a germination experiment, 64 seeds were sown in a 128-plug tray filled with germination medium. 32 seeds were covered with coarse vermiculite and 32 seeds were left uncovered. The plug tray was placed in a mist house with a 10-minute mist interval. Temperatures were maintained at 21°C (70°F) day and night. Light conditions were set for 16 hours at 150 µmol. Sowing took place during week 7. By week 18 0% of the seeds had germinated. This may be due to improper germination conditions or a hard seed coat dormancy. As such, further experimentation is recommended with focus on overcoming dormancy, either through mechanical/acid scarification or by stratification.

For other *Romulea* species germination recommendations include maintaining a germination temperature of 10-15°C (50-59°F) or exposure to 21 days of cold stratification at 5°C (41° F) (Swart 2012).

There does exist potential for *Romulea subfistulosa* to become a successful flower crop in North America. However, there are obstacles to overcome. Namely, uncommon growing conditions, winter flowing, delayed flower development and difficult seed germination. Despite this, Pierre André Swart, in his 2012 thesis on the propagation of *Romulea* species, reports : "Many horticulturalists I have spoken to during this study are not just interested in *Romulea* because of their beautiful flowers, but also because growing seeds of *Romulea* to the flowering stage is considered somewhat of a horticultural feat and they aspire to the challenge" (Swart 2012).

Figure 1. *Romulea subfistulosa*. (Photos courtesy of Alan Horstmann.)

Figure 2. Corms of *R. subfistulosa* on 1 cm grid. (Photo courtesy of Mary Sue Ittner.)

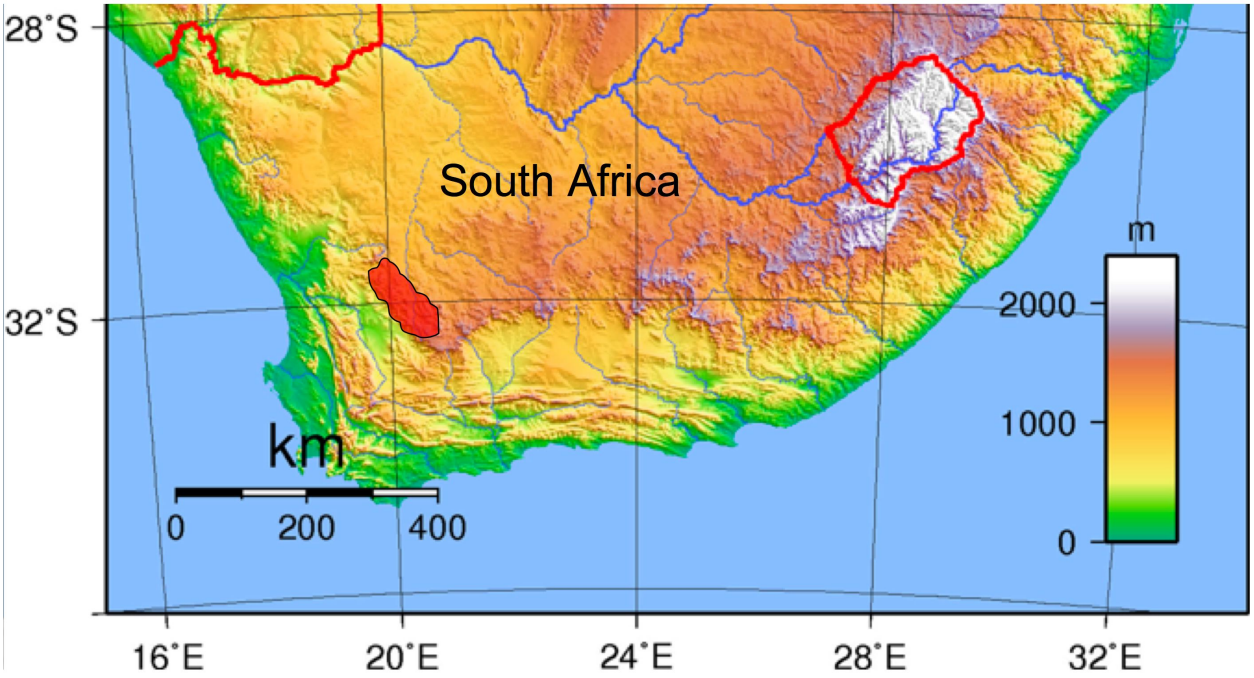

Figure 3. Geographical distribution of *R. subfistulosa* (in red).

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